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CAUSE AND EFFECT OF RECENT MERGERS

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WP# 2033-88 June 1988

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by

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CAUSE AND EFFECT OF RECENT MERGERS

I. Introduction

Over the period 1980 - 1986, the volume of reported merger activity has increased at an average annual rate of 25.6 percent, from $44.3 billion to $173.3 billion. This change reflects in part an increase in the average size of reported mergers[1], from $49.8 million in 1980 to $117.9 million in 1986. These figures indicate that large corporations are increasingly becoming targets of acquisition. The increase in merger activity is supported by two developments. On one level, major innovations in the capital market facilitate the assembly of large sums of money necessary for large acquisitions; on another, antitrust policy under the Reagan Administration is more tolerant of such acquisitions. The sheer volume of this phenomenon coupled with the publicity surrounding the largest merger transactions have drawn public attention resulting in congressional hearings and a call for government intervention. The response of the academic community adds up to a significant increase in the number of studies, most of which rely on pre-1980 data, focusing on the description of this phenomenon rather than its explanation [2, 3, 4, 5, 9, 10, 15, 18, 19, 20, 21, 24, 26, 46, 53, 58, 60]. As a consequence, financial theorists are still uncertain about the causes behind the current wave of mergers [26, 45].

This study develops a model of mergers as a vehicle for tax arbitrage and tests it on post-1980 data. Overlooked in previous studies, the proposed source of arbitrage gain is the two-tier

taxation of corporate-source income underlying the U.S. tax system, where the personal tax is paid only at trading and distribution. Under this system, a corporation will gain from using its pre-personal tax funds to acquire the assets of another at the lower price commensurate with a post-tax stock market value. A cash-for-stock acquisition strips the net assets of the target of their presonal tax wedge; the resulting gain to the shareholders of both firms is only partially offset by additional personal taxes. This explanation of the current merger epidemic differs from claims often made by the acquiring management; nevertheless, validity of our hypothesis does not require management awareness of the source of the gain. We quantify the tax wedge and then successfully test our theory on a sample of 86 cash-for-stock mergers occurring between 1981 and 1984. The average combined gain generated by mergers studied is substantial and largely explained by the tax wedge in the target firm. About three-fifths of that gain goes to the shareholders of the target and the remainder to the acquiring firm and, after tax, to its shareholders. Unlike most earlier studies, our estimated gain to the acquiring firm is substantial and significant. We suggest an explanation for the evidence that the target's shareholders are the main beneficiaries of the typical merger.

While our model is a good predictor of the potential gain from merger, it cannot presently predict the occurrence of specific mergers. Hence, the most immediate implications of our findings are for public policy and for firms negotiating a

merger, not for investors seeking to identify merger targets. Our main policy recommendation calls for the imposition of a tax on cash-for-stock acquisitions. The results indicate that without a corrective tax, mergers may have adverse effects on economic efficiency by using up resources in related services and by shifting tax burdens. However, even without the proposed tax, no major effects are expected on competition or the concentration of corporate assets. If valid, our findings indicate that the 1986 Tax Reform Act will not have some of the anticipated effects on mergers [57]. In particular, the effects of the decrease in the maximum tax rate on dividends and the increase in the capital gains tax will be roughly offsetting. Similarly, the elimination of the General Utilities Doctrine, the ruling allowing corporations to increase depreciation by writing-up the value of acquired assets, will not diminish the main tax benefit from mergers.

The study is set up according to the following plan. Section II details the proposed theory of corporate mergers, translated to a model in section III. Section IV introduces the main empirical model, followed by a description of the data in section V. The empirical results are presented in section VI and further interpreted in section VII. Policy implications of our findings are discussed in section VIII.

II. A Tax Theory of Corporate Acquisitions

In the absence of personal taxes, there would be no difference between the cost of funds held by the corporation and those

held by shareholders. Consequently, the unobservable value of net assets (i.e., assets less debt liabilities) would equal the observable market value of the common stock. This parity is destroyed under our tax system, where corporate-source income is subject to personal taxes only at trading and distribution, since such taxes drive a wedge between the corporate and shareholder costs of funds.

We base our claim of a tax incentive for corporate acquisitions on the assumption of a systematic and significant discrepancy between the corporate and shareholder costs of funds, which in turn requires the assumption that shareholders pay a significant tax[2]. In terms of valuation, personal taxes create a post-tax market equity value that is smaller than the unobservable pre-tax net asset value. Absent prohibitive transaction costs and legal restrictions, this discrepancy enables any corporation to gain from purchasing the assets of another by acquiring full stock ownership over those assets.[3]

The tax incentive for merger is illustrated by the following simplified example, assuming value additivity and ignoring all other sources of synergy.[4] Consider a non-growth target firm (T) having assets with a pre-personal-tax value of $1,000 and a corresponding pre-tax equity value of $1,000. (All values cited are on a post-corporate-tax basis.) A non-growth acquiring firm (P) has assets with a pre-tax value of $10,000 ($2,000 in cash and $8,000 in other assets) and a corresponding equity value of $10,000. Pre-tax asset values are imputed by grossing-up observed

post-tax market values of equity based on an estimated tax effect. If all future earnings of both firms are to be distributed and subjected to a pre-1987 40 percent dividend tax, the stocks of these firms would have the corresponding post-tax market values of $1,000(1-.4)=$600 and $10,000(1-.4)=$6,000. Consistently, the value claimed by the government is the discounted stream of dividend tax revenues to be generated by each firm, $400 and $4,000, respectively. The pre-merger balance sheets of the parties involved are illustrated below.

Before Acquisition

CORPORATION T (IMPUTED)		CORPORATION P (IMPUTED)	
Assets 1,000	Equity 1,000	Cash 2,000	
		Other Assets 8,000	Equity 10,000

SHAREHOLDERS T(OBSERVED)		SHAREHOLDERS P(OBSERVED)	
Stock T 600	Equity 600	Stock P 6,000	Equity 6,000

U.S. GOVERNMENT (IMPUTED)		
Dividend tax wedge T	400	
Dividend tax wedge P	4000	Equity 4,400

Now assume that firm P proceeds to acquire for cash the entire stock of firm T, paying for it $900 including $300 in premium. The post-merger balance sheets provided below indicate the following changes. The consolidated balance sheet of firm P shows a decrease of $900 in cash, offset by an increase of $1,000 in assets originating in firm T. For those assets, the personal tax wedge of T has been replaced by that of P. The pre-tax gain

from the acquisition includes the $300 in premium going to the target's shareholders and the $100 increment in net assets to the acquiring firm. The combined pre-tax gain of $400 equals the pre-merger tax wedge in the target. The post-tax gain includes the net gain to the target's shareholders who must pay without delay capital gains tax at the pre-1987 rate of (.4)(.4) =.16 on a gain of $300, and the net gain to the acquiring firm's shareholders for whom an assets' increase of $100 is diminished by a tax wedge at the ordinary rate of .4.

After Acquisition

CONSOLODATED CORPORATION P (IMPUTED)

Cash	1,100		
Assets of T	1,000		
Other Assets	8,000	Equity	10,100

SHAREHOLDERS OF T

Cash for fair value		600			
Cash premium	300				
less: tax	48	252	Equity		852

SHAREHOLDERS OF P

Stock of P	6,060	Equity	6,060

U.S. Government (IMPUTED)

Capital gains tax, T shareholders	48		
Dividend tax wedge in P	4,040	Equity	4,084

The Statement of Asset Changes summarizes the net effects on the three parties involved: A combined post-tax gain to shareholders of $300(1-.16) + $100(1-.4) = $312 originates with an equivalent loss in value of tax revenue.

ASSET CHANGES

T shareholders:	Cash premium	300
	Less: Capital gains tax	(48)
	Net gain	252
P shareholders:	Pre-tax assets	100
	Less: Dividend tax burden	(40)
	Net gain	60
U.S. Government:	Lost divident tax in T	(400)
	Increased capital gains tax in T	48
	Increased dividend tax in P	40
	Net loss	(312)

As illustrated by this example, under the U.S. tax system, cash-for-stock acquisitions by corporations are a source of semi-arbitrage gain. The combined pre-tax gain generated by the two firms is systematic but uncertain due to a variety of unpredictable changes caused by the merger. Given the choice of a target, that gain is essentially independent of other synergies and management motives. That gain equals the tax wedge (i.e., the difference between pre-tax and post-tax values) of the target's net assets less transaction costs. The tax wedge is a function of shareholders' marginal tax bracket in the target. The gain to the shareholders of the target is the premium paid on their stock. At most, this gain may be subject to capital gains tax at the personal level. Gain accrues to the acquiring firm if the price paid for the acquired assets, plus transaction costs, is below their pre-personal tax value. Any gain to the acquiring firm is subject to the full personal tax wedge between the net assets of that firm and its shareholders' equity.

Unlike a cash-for-stock acquisition, a stock-for-stock

acquisition would be a simple consolidation of the assets and liabilities of the two firms, generating no gain from the tax wedge of the target. The shareholders of the target exchange $1000 of equity in the target for $1000 of equity in the acquiring firm. Similarly, under an asset-for-asset acquisition, the acquiring firm would pay $1000 in cash for the assets of the target, changing the asset composition of both firms but not the asset value of either.

III. The Model

Our corporate acquisition model follows Marcus et al. [35], who extend the Gordon-Miller-Modigliani growth model to analyze the interaction of growth and taxes under the U.S. tax system. Although these models do not incorporate risk explicitly, this is not a drawback in the present context. If markets are efficient, then real and financial assets are fairly priced at all times, precluding any systematic gain from intra-firm diversification.

Let:

V = pre-merger market value of the target firm's equity;

A = pre-merger value of the target firm's net assets (i.e., assets net of debt liabilities);

E = pre-corporate-tax earnings accrued at the end of the year;

b = firm's reinvestment ratio, namely, periodic investment as a fraction of pre-tax earnings, E;

e = the fraction of b financed internally by retention;

g = growth rate of earnings, dividends, and price per share;

r = post-tax equivalent-risk opportunity rate of return earned by shareholders, conveniently assumed to be independent of the growth rate, g;

t_k = marginal rate of corporate profit tax;

t_p = shareholders' marginal tax rate on "unearned" personal income, including dividends;

t_c = shareholders' marginal tax rate on realized capital gains;

i = share marginal holding period measured in years, assumed to begin ex-dividend.

The shareholders of a fixed-leverage firm with constant perpetual growth perceive the following post-tax dividend in year j: $E(1-eb-t_k)(1-t_p)(1-g)^{j-1}$. With annual ex-dividend trading, the capital gains tax in year j would be $t_cV[(1+g)-1](1+g)^{j-1}$. The present value of the firm's equity would be[5, 6]

$$V = \frac{E(1-eb-t_k)(1-t_p)}{r-g} - V\frac{t_c(1+g)}{r-g} \quad .$$

(subject to $r > g$)

With an i-year holding period ($i \geq 1$), the value of the capital gains tax payment becomes $Vt_c(1+g)^i/[(1+r)^i-(1+g)^i]$ and the present value of the firm's equity value is

$$V = \frac{E(1-eb-t_k)(1-t_p)}{r-g} - V\frac{t_c(1+g)^i}{(1+r)^i-(1+g)^i} \quad .$$

A formula for the firm's market equity value is obtained by solving this equation for V:

$$V = \frac{E(1-eb-t_k)(1-t_p)}{r-g} \cdot \frac{1}{w_i} \qquad (1)$$

where

$$w_i = 1 + \frac{t_c(1+g)^i}{(1+r)^i - (1+g)^i} \cdot \qquad (2)$$

The pre-personal-tax value of the corporation's net assets is derived from (1) by setting the personal tax rates at zero:

$$A = \frac{E(1-eb-t_k)}{r-g} \cdot \qquad (3)$$

Based on the relationship between (1) and (3), the unobservable pre-personal-tax net asset value can be determined from the observable (post-tax) equity market value by

$$A = V \frac{w_i}{1-t_p} \cdot \qquad (4)$$

Assume now that this corporation becomes a target for a takeover by another, whose shareholders are subject to the same marginal tax rates, t_k, t_p, and t_c. In the absence of transaction costs and other synergies, the maximum price that can be offered by the acquiring firm for the stock of the target is the value A [stated by (3)], the pre-merger pre-personal-tax net asset value of the target. The minimum price acceptable to the

shareholders of the target is the value V [stated by (1)], the pre-merger post-tax market value of their stock, plus compensation for any additional tax liability arising from the transaction itself. If the merger is optimally timed to coincide with the end of the i-year trading cycle, only the merger premium, if any, is subject to such a tax. The combined pre-tax gain from merger is the pre-merger difference A-V measured in the target. According to (1) and (2), that gain is proportional to the equity size of the target, as measured by its discounted dividend flow $E(1-eb-t_k)/(r-g)$, but independent of the size of the acquiring firm. The ratio $A/V = w_i/(1-t_p) \geq 1$ can be interpreted as an index of the combined gross incentive to transfer ownership in the target, where $A/V > 1$ implies the presence of such an incentive.[7] This incentive is directly related to the rates of personal tax and growth; it is inversely related to the rate of interest and the holding period, but independent of the rate of corporate tax.

Transaction costs and effective personal tax loopholes narrow the range of admissible acquisition prices. The combined pre-tax gain from acquisition, A-V, is decreased by the same amount. These factors may disrupt the relationship between the hypothetical and actual gain from merger.[8]

IV. Testable Hypotheses

The central claim of this study, that a cash-for-stock merger generates a gain due to a personal tax wedge in the valuation of the target's assets, can be tested by observing the

effect of mergers on the equity market values of the firms involved.

Absent transaction costs, the tax wedge hypothesis implies the following theoretical relationship between the target's pre-merger tax wedge (r.h.s.) and residual changes in both firms, representing the pre-tax gain from any cash-for-stock acquisition

$$\Delta V^T + \Delta A^P = A^T - V^T$$

with the superscripts T and P identifying the target and acquiring firms, respectively. This relationship is translated to the empirical linear equation

$$\Delta V^T + \Delta A^P = a + b(A^T - V^T) + c_1X_1 + \ldots + c_nX_n + e \qquad (5)$$

where a is the constant term, and b is the coefficient of the tax wedge, c_iX_i represent other variables and their coefficients, and e is an error term. Based on (4) and (5), our hypothesis is tested by:[9]

$$\Delta V^T + \Delta V^P w_i/(1-t_p) = a + bV^T[w_i/(1-t_p)-1] + c_1X_1 + \ldots + c_nX_n + e \; . \qquad (6)$$

The presence of V^T and w_i on both sides of this equation could bias the results by introducing spurious correlation. To guard against this possibility, we recalculated variations of equation (6) without V^T and/or with the mean of w_i replacing firm-specific w_i on the l.h.s. There was no significant difference in the results.[10]

Equation (6) estimates the parameters a and b using independent estimates of the tax rate t_p and the parameters entering w_i

(r,g,i,t_c) based on (2). Departing from the accepted method of representing the net assets by their book values based on historical costs [10, 11, 32, 43, 44, 54], we estimate the value of net assets in (5) based on market valuation.

The relationship $b<1$ and $a<0$ would be interpreted as evidence of transaction costs or effective tax loopholes unaccounted for by the theoretical model. Fixed costs would be indicated by $a<0$, and costs proportional to the size of the transaction by $b<1$.

The portion of the actual gain accruing to each firm can be described as a function of the joint theoretical gain by rewriting (6) separately for each firm. Shareholders of the target benefit according to[11]

$$\Delta V^T = a' + b'V^T[w_i/(1-t_p)-1] + c_1X_1 + \ldots + c_nX_n + e \quad . \tag{7}$$

Shareholders of the acquiring firm benefit according to

$$\Delta V^P[w_i/(1-t_p)] = a'' + b''V^T[w_i/(1-t_p)-1] + c_1X_1 + \ldots + c_nX_n + e \quad . \tag{8}$$

Jointly with the main hypothesis, we test for the effects of the following additional factors $(X_1, \ldots, X_n)$. Structural stability over time is tested by including a dummy variable for the year of acquisition. The competing hypotheses of monopoly and efficiency [27, 20, 24] are tested by a dummy variable for the type of merger (horizontal, vertical, or conglomerate). Differential effects of transaction costs and information asymmetry are tested by the percentage of institutional ownership. We also test

the competing hypothesis that merger is a tax-effective distribution method [44, 7, 26] by including a cash variable for the acquiring firm, and the hypothesis of corporate tax synergy via depreciation [5, 49, 54] by including a variable for fixed assets or depreciation.

V. Data

A. The Sample

W.T. Grimm reports over nine thousand mergers and acquisitions between 1981 and 1984. Of those, about thirty-five hundred were divestitures (typically cash-for-asset acquisitions), over fifty-one hundred involved a privately held target firm, and about twelve hundred involved a foreign party. These mergers are excluded from the sample due to irrelevance or no information on one of the parties involved. After further elimination of acquisitions by private buyers, those involving a stock-for-stock exchange, those on which there is incomplete data, and those where one of the parties was in financial distress, 86 mergers remain that involved an exchange of cash for the stock of the target. Since the model imposes no restriction on repeated mergers by the same firm, such mergers were not excluded. Although this sample appears to be small, it compares favorably with previous studies and proved adequate to test our model. In principle, our model should apply to all cash-for-stock acquisitions among domestic corporations, including those involving closely-held corporations, a sample of thousands.

B. Tax Wedge Variables

V^T, V^P: Pre-merger equity value of the two firms. Since the effect of the merger on prices is measured over a period of approximately one year, it is necessary to suppress the effect of market-wide changes. Market influence is removed by deflating the change in value by the relevant S & P index adjusted for individual stock betas taken from Value Line. An alternative approach using an overall market index in lieu of individual betas produced similar results. Both methods are used in earlier research.

Mandelker [33] and Ellert [21] indicate that information concerning impending mergers leaks out starting at least four months prior to the first public announcement. To insure that the values are as free from interference as possible, the base date for all of the pre-merger quotations is six months before the first public announcement of a planned merger. This six-month period is used for both the target and the acquiring firm. In our sample of 86 mergers, the average equity size of the acquiring firm was over two-and-a-half times that of the target, 889 million dollars compared with 317 million dollars, respectively. Merger value of the target firm. Since partial acquisitions are excluded, this variable measures the actual price paid for the entire stock of the target, taken from Mergerstat. The average transaction size was 549.5 million dollars. A comparison of the equity value acquired with that prevailing six months before the merger indicated an average residual premium of $\Delta V^T/V^T = 76.8$

percent. Post-merger value of the acquiring firm. The methodology of Mandelker [33], Ellert [21], and Langetieg [29] differs from studies following Dodd and Ruback [18], which focus on the first public announcement. In our study, the date of the public announcement of the final merger agreement is chosen to insure that the probability of completion of the merger is unity, so that the change in price of both firms reflects the full gain from the merger. Measured as a rate, the average residlual post-tax gain for the acquiring firm is $\Delta V^P/V^P$ = 59 percent.

i: The target's holding period is calculated as the average share value outstanding divided by the annual trading volume). Poterba [43] argues that the holding period is unique to each stock and affected by its growth rate and other variables.

r: Although not explicit in the model, the post-tax discount rate applied by the target owners depends on the general level of interest rates and the relative risk of the target. To account for both effects, we use the actual pre-merger ex-post post-tax rate of return for the target shareholders. The effect of taxes is calculated by using "market" tax rates for dividends and capital gains (see discussion below). g: We use the target's annualized growth rate of earnings per share, which is more stable than that of the price per share, but less stable than the growth rate of dividends per share. The use of earnings avoids the obscuring effect of an unknown dividend policy, and the effect of changes in the general level of uncertainty and market interest rates on the share price. t_p: Based on Peterson et al.

[41], we assume a pre 1987 dividend tax rate of 40 percent. t_c: Consistent with the findings of Poterba [42], we use a pre-1987 effective capital gains tax rate of 16 percent which is four tenths of 40 percent.

C. Other Variables

Type of merger: A dummy variable classifying mergers as horizontal, vertical, or conglomerate. Market-extension mergers are included with horizontal mergers, product-extension mergers with either vertical or conglomerate mergers, and mergers which cannot be otherwise classified are placed in the conglomerate category. Calendar year of merger completion: A dummy variable indicating the year of final approval of the merger. Percentage of equity owned by institutions: A proxy for market factors. Target's ratio of depreciation to total assets; Target's ratio of gross fixed assets to total assets; Acquiring firm's annual percentage change in pre-merger cash position: These variables pertain to the year preceding the merger.

VII. Empirical Results

A. The Effect of Merger on The Combined Value

Regressions testing the tax-wedge hypothesis appear in Table 1, Panel A.[12] Regression (i) is the most direct test of our basic relationship as stated by (5). As predicted, the results show a positive and significant relationship between the tax wedge (r.h.s.) and the combined change in market values. The

TABLE 1

THE TARGET'S TAX WEDGE AND THE GAIN FROM MERGER

Regression Number	Dependent Variable	Intercept (t-scores)	Theoretical Tax Variable	1982	1983	1984	Horizontal Mergers	Vertical Mergers	Percentage of Institutional Ownership Target	Percentage of Institutional Ownership Purchaser	Cash in Acquiring Firm	Ratio of Gross Fixed Assets to Total Assets (Target)	Ratio of Depreciation to Total Assets (Target)
Panel A													
I	Combined Firm Value	-1.1189 (-.012)	0.6835 (12.2702)	-	-	-	-	-	-	-	-	-	-
				ADJUSTED R-SQUARED .64									
II	Combined Firm Value	-17.0045 (-.0736)	0.7035 (12.0073)	-132.3999 (-.5231)	83.0077 (.3091)	-368.7547 (-1.3956)	-	-	-243.4827 (-3921)	387.1563 (.7456)	-	-	-
				ADJUSTED R-SQUARED .64									
III	Combined Firm Value	31.42 (.0015)	0.6865 (11.6869)	-	-	-	-32.8512 (-.1607)	-520.0695 (-1.8611)	-566.0618 (-.915)	323.6944 (.6103)	-28.036 (-.2521)	-	18.9447 (.074)
				ADJUSTED R-SQUARED .64									
IV	Combined Firm Value	-54.5853 (-.2508)	0.6813 (11.6201)	-	-	-	-36.3404 (-.1784)	-587.9411 (-2.0268)	-529.6749 (-.8577)	214.087 (.3972)	-41.954 (-.3745)	257.9209 (.7969)	-
				ADJUSTED R-SQUARED .64									
Panel B													
I	Change In Value Target Firm	70.999 (2.0857)	0.4421 (21.6834)	-	-	-	-	-	-	-	-	-	-
				ADJUSTED R-SQUARED .85									
II	Change In Value Target Firm	94.8687 (1.2559)	0.4462 (21.1107)	-	-	-	-98.9838 (-1.334)	-62.2179 (-.6135)	385.0508 (1.7151)	75.699 (.3933)	-7.8005 (-.1933)	-	29.8348 (.3211)
				ADJUSTED R-SQUARED .85									
III	Change In Value Target Firm	56.6082 (.725)	0.4334 (20.6094)	-	-	-	-101.722 (-1.3926)	-109.4499 (-1.0519)	412.4 (1.8618)	2.4024 (.0124)	-17.4951 (-.4354)	187.4297 (1.6146)	-
				ADJUSTED R-SQUARED .85									
Panel C													
I	Change In Value Purchaser	-72.1179 (-.855)	0.2413 (4.7764)	-	-	-	-	-	-	-	-	-	-
				ADJUSTED R-SQUARED .21									
II	Change In Value Purchaser	-94.5545 (-.5092)	0.249 (4.7519)	-	-	-	66.1327 (.3626)	-457.8517 (-1.8366)	-951.1127 (-1.7234)	247.9953 (.5241)	-20.2356 (-.204)	-	-10.89 (-.0477)
				ADJUSTED R-SQUARED .23									
III	Change In Value Purchaser	-111.1935 (-.5705)	0.2479 (4.722)	-	-	-	65.3816 (.3586)	-478.4913 (-1.8422)	-942.0752 (-1.7037)	211.6845 (.4386)	-24.4589 (-.2438)	70.4911 (.2432)	-
				ADJUSTED R-SQUARED .23									

coefficient of .68 indicates that the pre-tax gain is about two-thirds of that anticipated in the absence of variable transaction costs and effective tax loopholes. The significant difference between our estimated coefficient and the theoretical coefficient of unity is interpreted as evidence of large variable transaction costs and/or substantial tax avoidance which lowers the marginal tax bracket as per Miller and Scholes [38]. Consistent with the presence of fixed transaction costs, the intercept is negative although small and insignificant. An adjusted R^2 of about .64 confirms the role of the personal tax wedge in providing the source of arbitrage gain and the incentive to merge. Variations in the dollar gain from merger are largely explained by pre-merger differences in the target's tax wedge.

The size of transaction costs may be affected by instutional ownership. To reflect the influence of this factor, we include the ratios of institutional ownership in regression (ii). The ratios of the two firms showed collinearity, which was removed by substituting for original values residuals obtained by regressing the collinear variables on each other. Regression (i) is further refined by recognizing potential structural changes due to changes in the rates of interest, inflation, and growth, and the deferral period. Based on the t-values and the adjusted R^2, these additional variables appear to have no systematic effect on the gain from merger. This result lends legitimacy to our procedure of comparing mergers spanning a four-year period.

Regression (iii) includes additional variables to reflect

the effects of the type of merger, depreciation in the target firm, and cash in the acquiring firm. The absence of a significant positive coefficient for vertical and horizontal mergers is consistent with the results of Elgers and Clark [20], and Gordon and Yagil [24].

The lack of significance of the pre-merger cash variable fails to confirm the claim that merger is a tax-effective distribution method for the acquiring firm [44, 7, 25]. While in our model the gain from merger depends on the total net assets of the target regardless of how the funds for the acquisition are obtained, according to the distribution hypothesis that gain is unrelated to the net assets of the target, but is determined by the amount of cash available for distribution in the acquiring firm. It follows that under the distribution hypothesis, the acquiring firm would normally use accumulated cash rather than external funds to finance the acquisition. The insignificance of the cash variable is not suprising. Despite claims to the contrary, merger is not similar to stock repurchase. where as in the latter the benefit automatically accrues to the shareholders of the firm pursuing the distribution, in the former it would accrue to the owners of another firm. Indeed, why would the shareholders of the acquiring firm subsidize the owners of the target, unless they can share in the subsidy? This would only be possible by means of a costly and illegal reciprocal arrangement, unlikely for two public companies.

B. The Separate Effects on the Merger's Participants

The regressions reported in Panels B and C of Table 1 use as dependent variables the changes in value of the target and the acquiring firms, respectively. Although some of the independent variables in Panel A show no significant relationship to the combined value, one cannot rule out the possibility that those variables could exert influence on one or both of the participants, an influence which cancels out in the combination.

The target firm. The first regression in Panel B, based on equation (7), contains as an independent variable only the tax wedge, the coefficient of which is positive and significant. Since the coefficient for the combined change in value (Panel A) is .68, the present coefficient of nearly .44 shows that the target receives the larger portion, on average 65 percent of the pre-tax gain produced by the merger. Earlier studies are consistent in showing a greater share to the target [2, 15, 17, 18, 33]. In further support of our theory, the adjusted R^2 of .85 shows that variations in the gain to the target closely follow variations in its tax wedge.

These results remain essentially intact in the presence of additional variables accounting for the year in which the merger occurred, the type of merger, and the ratios of institutional ownership, cash, depreciation, and fixed assets. The stability of the results suggests the importance of the tax wedge as a determinant of the target's gain from merger.

The acquiring firm. Following equation (8), Panel C

contains the same set of independent variables as Panel B, using the gain to the acquiring firm as the dependent variable. All of the regressions show a positive and significant coefficient for the tax-wedge variable. This coefficient remains stable around .24, indicating that the acquiring firm receives, on average 35 percent of the actual pre-tax gain produced by the merger. These results are consistent with previous studies in showing a smaller gain to the acquiring firm, or none at all, [2, 4, 8, 17, 18, 21, 29, 32, 33, 44], but differ in that the gain is substantial and statistically significant.

With few exceptions [4, 8, 18], previous studies do not show a systematic gain for the acquiring firm [2, 17, 29, 32], leading to the unattractive implication of incongruent or irrational behavior on the part of shareholders and managers [45]. Our results suggest that the shareholders of the typical acquiring firm expect and receive a substantial gain from merger.

Having discovered the source of systematic gain generated by mergers, we offer an explanation for the unequal sharing of that gain. Our focus is on the acquiring management. The management initiating the acquisition possesses unique and valuable information about the identity of the target and the timing of the event. To the extent that managers as insiders are effectively less restricted in acting privately on information concerning firms other than their own, and to the extent that their holdings in their own firm are small, they have an incentive to submit a tender offer or consummate a merger bidding up the price of the

target at the expense of their own firm's shareholders. Given the target and timing of the merger, the pursuit of a private gain by the acquiring management would not affect the combined pre-tax gain, but shift a greater portion of it to the target. Management pursuit of a private gain is consistent with our tax-wedge hypothesis but cannot replace it; any private gain must ride on a systematic combined gain to the parties involved, and that must reflect an external source of value.

VII. Further Interpretation

In further interpretation of our theory and results, it is noted that the relative size of the two firms involved in the merger should not matter except as it may affect transaction costs. A firm can purchase a larger one with the help of borrowed funds, repaying the loan by divestiture of assets or by other means [23, 57]. The combination of transactions may affect the combined net gain to shareholders but not the gross gain produced by the tax-wedge in the target. This interpretation is consistent with evidence that large firms are sometimes acquired by small ones,in which case the merger is often financed by borrowing and followed by divestiture. We propose the hypothesis that the observed activity of asset-for-asset acquisitions is partly a by-product of profitable cash-for-stock acquisitions.

A final observation concerns an obvious limitation of a theory which predicts unlimited merger activity by all profitable corporations. Since our theory does not specify the costs mit-

igating merger activity, it cannot predict specific mergers, let alone recommend ones. In its present stage, our theory would be most useful in formulating public policy toward mergers.

VIII. Policy Implications

Our results have implications for the individual firm, for investors, and for public policy. At the level of the firm and its shareholders, the main implication is that the gain from merger, especially for the target, can be predicted with some degree of certainty. Additional tentative implications concern the choice of timing, target, and terms of merger. On the question of timing, our model indicates that the gain per dollar value of the target's net assets is inversely related to the rate of interest. Regarding the selection of a takeover target, the results clearly demonstrate that the total gain increases with the equity of the target and its per-share growth rate, but is not affected by its tax status as long as the corporate tax rate is equal in the two firms. For negotiating the terms of the merger, the model quantifies the gain to be divided between the two firms, providing a basis for pricing the target.

In this country, the traditional tool of public policy toward mergers is antitrust legislation. The tax gain generated according to our theory is not within the purview of that law. Realization of that gain through merger has a net social cost because companies change their economic behavior without producing an offsetting social gain. Even without the alleged effect of large conglomerate mergers on the concentration of corporate

wealth [6], all cash-for-stock acquisitions cause a loss of tax revenue which, if raised by other means, distorts the tax system. Mergers induced by the tax wedge further cause a welfare loss by using up resources in the process of acquisition, and often additional resources in any divestiture designed to offset the real consequences of the merger. The problem in designing a policy aimed at preventing social waste is that all cash-for-stock acquisitions generate a private tax gain, but only some generate social gains. A selective restriction on wasteful mergers would create the impossible task of calculating the net social consequences of each merger.

An alternative approach would concentrate on the removal of the tax-wedge gain from all mergers through tax reform. For example, instead of the present distribution tax, all corporations may be treated like S-Corporations by personally taxing shareholders for their portion in earnings, whether distributed or not. This would remove the tax wedge between funds available to corporations and their shareholders and, with it, the incentive to merge. A more feasible alternative is to outlaw cash-for-stock acquisitions. Since any real gains can be realized via stock-for-stock acquisitions, and since such acquisitions appear to use up roughly the same resources, this restriction would protect mergers consistent with social benefit (or monopoly gain). Perhaps the most efficient measure would be to impose a lump-sum tax designed to replace the value of the tax revenue lost as per our model. Such a tax would selectively remove the

alleged tax incentive from all mergers, placing no new barriers before companies attempting to achieve private gain when consistent with social benefit.

Additional policy implications concern potential actions which the government should not take. In demonstrating the overwhelming importance of a specific tax incentive, our results indicate the negligible contribution of competing explanations. One implication of the results is that recent mergers have no major direct effect on economic efficiency. Any acquiring firm can optimally restructure its assets and liabilities following the acquisition, without affecting the gain from it. By the same token, there are no necessary side effects on the extent of competition or concentration of corporate assets. Another implication concerns the effect of recent mergers on small shareholders of the target firm. As predicted by our theory, the results show that shareholders large and small are the primary beneficiaries of recent mergers. Of the two groups of owners, all the shareholders of the target are likely to make the greatest proportional gain.

Further policy implications concern the effects of the 1986 Tax Reform Act. One feature of that Act is intended to diminish the incentive to merge by limiting the opportunity of an acquiring firm to step-up the asset base of a target in line with the so-called General Utilities Doctrine [58]. Our empirical findings and those of Auerbach and Reishus [5] strongly indicate that this modification will have little effect on the overall tax

incentive to merge.

Another feature of the Act lowers the maximum tax rate of ordinary income and raises that of capital gains, setting the maximum rates of both taxes at thirty-three percent. According to our model, this change would have conflicting effects on the incentive to merge. Ignoring any effects on the post-tax rate of return, a decrease in the marginal tax rate on dividends should increase that incentive, and an increase in the marginal tax rate on capital gains should have the opposite effect. Under a realistic holding period and feasible rates of interest and growth, the two effects would roughly offset each other, leaving the tax incentive to merge virtually unchanged.

ENDNOTES

1. Following the academic literature on this subject, the terms "takeover," "acquisition," and "merger," are used interchangeably.

2. This assumption is challanged by a number of writers on theoretical grounds [48, 38, 1, 52, 12, 13], but empirically confirmed by others [22, 41, 43].

3. The firm's opportunity to profit from buying the assets of another firm through the stock market was explored by Keynes [28, ch. 12] and by a number of writers in recent years [55, 56, 11, 44, 54, 42, 10].

4. A potential corporate tax synergy depends on the marginal tax rates of the two firms and the relationship between book value and acquisition value of the target assets [5]. We test for the latter effect below.

5. Under partial acquisition, E and V are prorated according to the fraction of equity acquired.

6. Note that this formulation ignores distribution of earnings via tax-savings distribution methods such as stock repurchase and liquidation dividend. For a valuation model under stock repurchase distribution see Palmon and Yaari [40].

7. Measured in this fashion, the incentive to merge ignores the additional layer of personal taxes imposed on the gain itself. This effect is illustrated in the numerical example and addressed below.

8. There is evidence that legal fees alone may be as high as 1.5 percent of the total value of the transaction [36].

9. The use of the target's w_i on both sides of the equation reflects the assumption that the underlying parameters are asset-specific rather than firm-specific. Put differently, it is assumed that the personal tax wedge of the acquired assets is not changed by the acquisition.

10. The transformation required as a result of removing V^T is discussed below.

11. Like equation (5), V^T and its first difference appear on both sides of (7). To test for spurious influence, we use the subscribts 0 and 1 to denote observed values before and after the merger agreement, and estimate b^* from a second version of (7)

without V_0^T:

$$V_1^T = a^* + b^* V_0^T [w_i/(1-t_p)] + e$$

and then transform

$$b = \frac{b^* w_i/(1-t_p) - 1}{w_i/(1-t_p) - 1} \quad .$$

The value of b calculated in this fashion was indistinguishable from that estimated directly in (7).

12. Preliminary estimates of eq. (5) exhibited heteroskedasticity, as measured by the Bartlett and Goldfeld-Quandt tests. To improve the efficiency of our estimates, we used the procedures of Weisberg [61], and Judge et al. [27] to transform the data.

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